

Technical Data Package for Ammunition Storage Quantity-Distance Reduction with Concertainer Barricades

A. EXECUTIVE SUMMARY

1. Purpose and Applicability

- a. This technical data package (TDP) describes a method for storing munitions in order to prevent prompt detonation propagation between stacks caused by high-speed fragments.
- b. This TDP may be applied to ammunition stacks containing up to 4,000 kg net explosive weight. These stacks may contain munitions in Hazard Division (HD) 1.1, 1.2, 1.3 and 1.4.

2. Construction

Concertainer barricades can be easily erected by three people, one of whom operates the heavy equipment. Once the bottom layer of bins is extended, they can be filled with sand or soil using a front-end loader. The lifetime is limited by the lifetime of Concertainer geofabric. Concertainer barricades should be inspected for any wear and deterioration and replaced periodically as required.

3. Benefits and Drawbacks

Compliance with this TDP reduces the required distance between ammunition stacks to 28 feet. DOD 6055.9 STD, C10 normally requires 43 feet. In tests, sand-filled Concertainer barricades prevented detonation from propagating between ammunition stacks. A typical Concertainer barricade takes only 20 minutes to deploy and fill using three soldiers working with one front-end loader. An approved site plan is required.

B. BACKGROUND

When ammunition is stored in the open, or when awaiting transportation, it is vulnerable to hostile attack or accidental stimuli that may produce fires, violent explosions, propagation between stacks, and consequent large-scale losses and damage. The Munitions Survivability Technology (MST) program was initiated by the TACOM-ARDEC Logistics R&D Activity, Picatinny Arsenal, NJ. The objective was to develop a rapidly deployable system of fragment barricades to prevent or reduce propagation of explosions between stacks of army ammunition. Testing with Composition B filled M107 projectiles acceptor stacks (see references 1 and 2) and extension of the results to larger munitions (see reference 3) to determine whether the DOD 6055.9 STD quantity-distance standards could be relaxed resulted in this Technical Data Package (TDP).

C. ITEM DESCRIPTION

The Hesco Bastion Concertainer Defense Wall System is an air-transportable revetment system that uses accordion foldout bins of geofabric-lined wire mesh (see reference 4). The system comes in folded lightweight units that extend to lengths of up to 100 feet. A complete listing of available units is given at Table 1. Although not required for quantity-distance reduction, use of these barricades prevents or reduces propagation of explosions between ammunition stacks.

D. PURPOSE AND APPLICABILITY

1. This technical data package (TDP) describes a method for storing munitions in order to prevent prompt detonation propagation between stacks caused by high-speed fragments.
2. This TDP may be applied to ammunition stacks containing up to 4,000 kg net explosive weight (NEW). These stacks may contain munitions including mixed Hazard Division (HD) 1.1 and 1.2 (SG 1 through SG 5), and HD 1.3 munitions. HD 1.4 munitions are also permitted without including their NEW in the total for the stack.
3. If DOD 6055.9 STD, C10 (see reference 5) is applicable, compatibility requirements do not apply. If DOD 6055.9 STD, C10 is not applicable, DOD 6055.9 STD, C3.5 allows authorized DoD components to mix compatibility groups except items in Groups A, K, and L in limited quantities (generally, 4,000 kg or less).

E. BENEFITS

1. When using the barricade described, the required spacing between ammunition stacks is reduced to 28 feet. The normal DOD 6055.9 STD and DOD 6055.9 STD, C10 requirement is 43 feet in the presence of a barricade. The quantity distance requirements for sites other than ammunition stacks (e.g., inhabited buildings, public traffic routes, etc.) are not reduced.
2. In tests, Concertainer barricades prevent stack-to-stack detonation propagation. The tested munitions were scattered about, but there was no sign of burning or fragment marks on any of them.
3. A typical Concertainer barricade unit (4.5 feet high by 3.5 feet wide by 32 feet long) is equivalent to approximately 1,500 stacked sandbags, but takes only 20 minutes to deploy and fill using three soldiers working with one front-end loader.
4. These capabilities increase survivability, reduce logistics resources for deployment, and reduce engineer troop and equipment requirements.

F. CONSTRUCTION

The tested barricades were constructed from selected elements of the Hesco Bastion Concertainer Defense Wall System (see Figures 1 and 2). Concertainer barricades may be constructed with troop labor using standard procedures and can be easily erected by three people. Barricades must be filled with sand or soil and have an 8-ft-thick base (e.g., two contiguous rows of 4-ft-thick Concertainer 8G bins) and a 5-ft-thick top (e.g., a single row of 4G bins). This creates a stepped barricade. The distance from the base of any barricade to the base of an adjacent ammunition stack must be at least 10 feet. Once the bottom layer of bins is extended, they can be filled using a front-end loader. It is important that the construction of the bottom layer is carefully monitored so that the fill is adequately compacted and the bins form their proper shape to ensure stability of additional layers. The barricades shall otherwise conform to the requirements of DOD 6055.9 STD, C5.3 (see reference 5) with particular attention to the requirements governing the relative heights of the barricades and the stacks.

G. LIFE EXPECTANCY

The lifetime is limited by the lifetime of the Concertainer barricades. They should be inspected for wear and deterioration every six months and replaced periodically if required.

H. SITE PLAN SUBMISSION

A site plan must be submitted in accordance with DOD 6055.9 STD, C5.6 to the Department of Defense Explosives Safety Board and approval must be obtained prior to the start of construction. Reference shall be made to this TDP when submitting a site plan.

I. REFERENCES

1. Strakenberg, J. et al, *A Summary of Analysis and Test Support for the Munitions Survivability Technology Program*, ARL-TR-2506, June 2001
2. Sullivan, J, et al, *Water Bag and Concertainer Detonation Barricades*, ARL-TR-2330, September 2000
3. Shope, R. and Tancreto, J., *Analysis and Certification Test of High Performance Magazine Pit Covers*, 27th Explosives Safety Seminar, Las Vegas, NV, August 1996.
4. Hesco Bastion Concertainer System, Hesco Bastion LTD, Unit 37 Knowsthorpe Gate, Cross Green Industrial Estate, Leeds, United Kingdom LS9 ONP.
5. Department of Defense Ammunition and Explosives Safety Standard, DOD 6055.9 STD, <http://www.ddesb.pentagon.mil/ddesb/documents.html>, July 1999.

J. ACKNOWLEDGEMENTS

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arranged by Raymond Cregar of ARL and performed by John Miller and his crew from the Aberdeen Test Center, Aberdeen Proving Ground, MD.

K. ADDITIONAL INFORMATION

Any questions or comments related to this Technical Data Package or the Munitions Survivability Technology Program should be directed to:

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Table 1. Hesco Bastion Concertainer Units (as of 27 Feb 2002)

Part Number	NSN	Length (ft)	Height (ft)	Width (ft)	Color	Cost US \$ (shipping not included)
MIL 1B	2590-99-835-7866	32.0	4.5	3.5	Grey	672.00
MIL 2B	2590-99-968-1764	4.0	2.0	2.0	Grey	48.00
MIL 3B	2590-99-001-9392	32.0	3.3	3.3	Grey	508.80
MIL 4B	2590-99-001-9393	32.0	3.3	5.0	Grey	763.20
MIL 5B	2590-99-001-9394	10.0	2.0	2.0	Grey	100.80
MIL 6B	2590-99-001-9305	20.0	2.0	2.0	Grey	193.60
MIL 7B	2590-99-169-0183	91.0	7.3	7.0	Grey	3,096.00
MIL 8B	2590-99-335-4902	32.0	4.5	4.0	Grey	687.00
MIL 9B	2590-99-563-5949	30.0	3.3	2.5	Grey	460.00
MIL 10B	2590-99-391-0852	100.0	7.0	5.0	Grey	3,256.00
MIL 1G	2590-99-001-9396	32.0	4.5	3.5	Green	720.00
MIL 2G	2590-99-001-9397	4.0	2.0	2.0	Green	51.20
MIL 3G	2590-99-001-9398	32.0	3.3	3.3	Green	545.60
MIL 4G	2590-99-001-9399	32.0	3.3	5.0	Green	819.00
MIL 5G	2590-99-001-9400	10.0	2.0	2.0	Green	107.20
MIL 6G	2590-99-001-9401	20.0	2.0	2.0	Green	208.00
MIL 7G	2590-99-126-3716	91.0	7.3	7.0	Green	3,312.00
MIL 8G	2590-99-517-3281	32.0	4.5	4.0	Green	735.00
MIL 9G	2590-99-052-0506	30.0	3.3	2.5	Green	492.00
MIL 10G	2590-99-770-0326	100.0	7.0	5.0	Green	3,484.00



Figure 1. Concertainer Barricade Test Arrangement

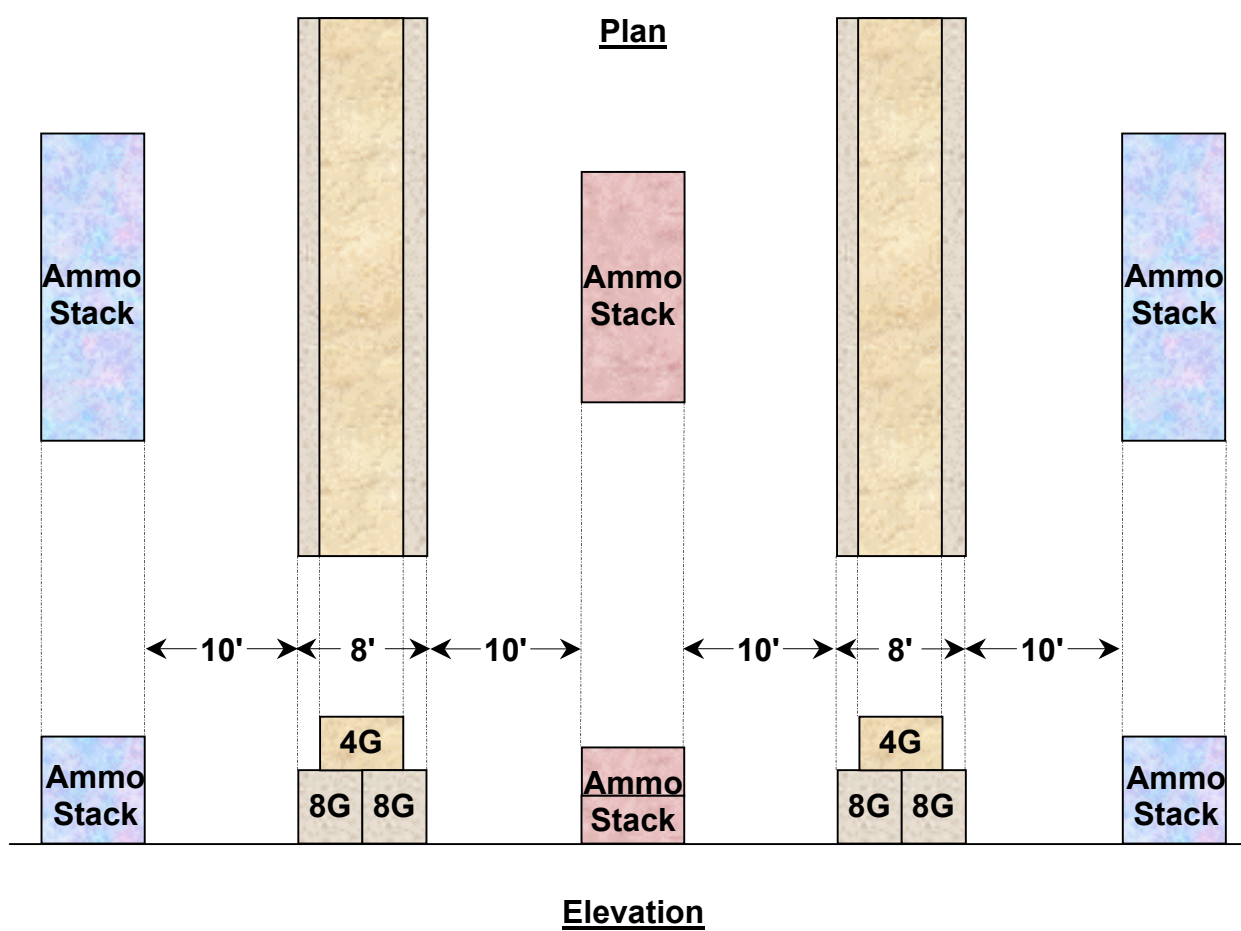


Figure 2a. Concertainer Barricade Layout

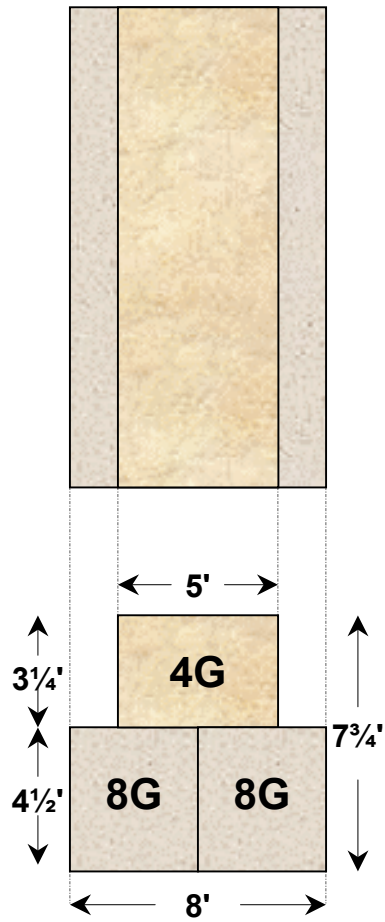


Figure 2b. Concertainer Barricade Design Detail.